



# Machine Guarding

## OSHA 10-Hour General Industry Course

Required Online Topic Time: 30m



# Learning Objectives



## Duration

30 minutes

## Terminal Learning Objective

Given current OSHA and industry information regarding general industry worksite illnesses, injuries, and/or fatalities, the student will be able to recognize hazards associated with machinery that has improper or missing guards.

## Enabling Learning Objectives

- Identify the main causes of machinery accidents.
- Recognize basic machinery parts that expose workers to hazards.
- Recognize workplace situations involving machinery that requires guarding.
- Identify the requirements for safeguards.
- Identify types of machine guards including types of devices used to safeguard machines.

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# Introduction



**It is critical that you start safe and stay safe around machinery.**

In today's world, machines are found in almost every workplace. They come in many different sizes and perform various functions. Many accidents result from persons working on, or around, moving machinery. These accidents could have been prevented by the installation and proper maintenance of guarding.





# Machinery Parts and Hazards



## Common hazards include:

- Reaching into 'clear' equipment
- Not using lockout/tagout
- Fixing machines
- Lack of machine guards



## Most accidents occur during:

- Operating unguarded or inadequately safeguarded machinery
- Materials handling, including during use of forklifts, compactors, powered and non-powered hand tools
- During activities involving stationary machines

# Machinery Parts and Hazards



All machines consist of three fundamental areas: **the point of operation, the power transmission device, and the operating controls.**

## Power Transmission

The power transmission apparatus is all components of the mechanical system which transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, cranks, and gears.

## Point of Operation

The point of operation is where work is performed on materials. Examples include cutting, shaping, boring, and forming of stock.

## Operating Controls

The operating controls are the mechanical or electric power controls used by the worker to operate the machine.

# Machinery Parts and Hazards



## Knowledge Key

The most common way workers get hurt around machines is by reaching-in to clean equipment, not using lockout tagout, interaction with parts where guards are missing, or allowing a person who is not qualified to work on a machine. The most common injuries are amputations, especially those of the fingers. There are three main parts of a machine that you will interact with; the point of operation, the power transmission, and the operating controls. Machine movements can be divided into two categories; motions and actions. Motions are how the machine part moves, for example rotating, in-running nip points, reciprocating, and transversing. Actions are operations the machine performs, such as cutting, punching, shearing, and bending.

# When Guarding is Required



**You must use a guard to minimize injury while using the following machines:**

- Guillotine cutters
- Shears
- Alligator shears
- Power presses
- Milling machines
- Power saws
- Jointers
- Portable power tools
- Forming rolls and calendars

Anytime you are working on a machine where the point of operation exposes you to injury, it must be guarded.

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# When Guarding is Required



## Fan Blades

When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades must be guarded. The guard must not have openings larger than one-half ( $\frac{1}{2}$ ) inch.

## Revolving Barrels, Containers, and Drums

Revolving barrels, containers, and drums must be guarded by an enclosure interlocked with the drive mechanism, so the barrel, gun, or container cannot revolve unless the guard enclosure is in place.

## Power Transmission Apparatus

The shafting, flywheels, pulleys, belts, chain drives, etc. of power transmission apparatus less than 7 feet from the floor or working platform must be guarded.

## Abrasive Wheel Machinery

On abrasive wheel machinery, there must be an adjustable tongue guard to within  $\frac{1}{4}$ " of the wheel, a work rest with a maximum opening of  $\frac{1}{8}$  of an inch, and a cover spindle end, nut, flange projections.



# When Guarding is Required



## Knowledge Key

Anytime you are working on a machine where the point of operation exposes you to injury, it must be guarded. Special hand tools used to avoid the point of operation are not an acceptable substitute. Fan blades, rotating barrels, containers, and drums, power transmission apparatus, and abrasive wheel machinery always require guards. Safeguards themselves must meet certain requirements and not add any danger.

# Types of Machine Safeguards



There are two types of primary safeguarding methods; **guards and devices.**

Guards place a physical barrier between the worker and the machine while devices either prevent or detect operator contact with the machine's point of operation or stops hazardous motion if a worker's body part comes too close to a moving machine part.

There are four types of guards; fixed, interlocked, adjustable, and self-adjusting. There are six types of devices; presence-sensing, pullback, restraint, safety trip controls, two-hand controls, and gates.

Secondary guards are generally considered less effective and should only be used if primary guards aren't possible or as a secondary safety measure.



# Types of Machine Safeguards



## Knowledge Key

There are two types of primary safeguarding methods; guards and devices. Guards place a physical barrier between the worker and the machine while devices either prevent or detect operator contact with the machine's point of operation or stops hazardous motion if a worker's body part comes too close to a moving machine part. There are four types of guards; fixed, interlocked, adjustable, and self-adjusting. There are six types of devices; presence-sensing, pullback, restraint, safety trip controls, two-hand controls, and gates. Secondary guards are generally considered less effective and should only be used if primary guards aren't possible or as a secondary safety measure.

# Conclusion



**Safeguards are essential for protecting workers from needless and preventable machinery-related injuries.**

A good rule to remember is that any machine part, function, or process which may cause injury must be safeguarded.





# Practice Questions



1. What are the most common ways workers get hurt around machines? **Select all that apply.**

- a. Reaching-in to clean equipment
- b. Using guards
- c. Not using lockout tagout
- d. Missing guards
- e. Unqualified operators

2. Which parts of a machine must be guarded? **Select all that apply.**

- a. Fan Blades
- b. Abrasive Wheel Machinery
- c. Revolving Barrels, Containers, and Drums
- d. Power Transmission Apparatus

3. All that matters is that guards are used. Even those that don't meet all requirements are better than nothing. Is this true or false?

- a. True
- b. False

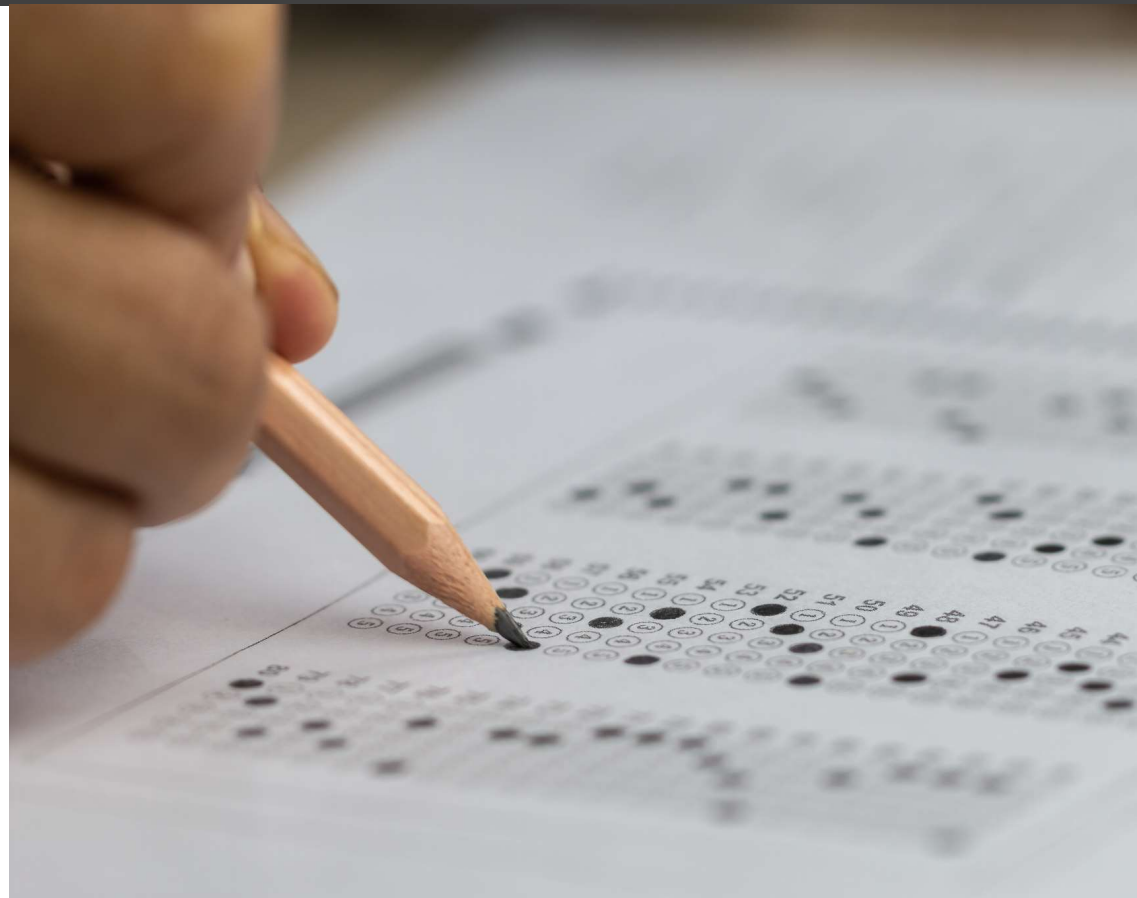
4. Select the two words that complete these sentences: \_\_\_\_\_ are how the machine part moves, for example rotating, in-running nip points, reciprocating, and transversing. \_\_\_\_\_ are operations the machine performs, such as cutting, punching, shearing, and bending. **Select all that apply.**

- a. Movements
- b. Motions
- c. Actions
- d. Operations

# Practice Questions Answer Key



1. A,C,D,E
2. A,B,C,D
3. B
4. B,C



# Great Job!



You've completed the  
Machine Guarding topic.

